Assessing the Poverty and Vulnerability Impact of Micro-Credit in Bangladesh: A case study of BRAC

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Summary findings

This paper explores the relationship between micro-credit and the reduction of poverty and vulnerability by focussing on BRAC, one of the largest micro-credit providers in Bangladesh. The main argument in this paper is that micro-credit contributes to mitigating a number of factors that contribute to vulnerability, whereas the impact on income-poverty is a function of borrowing beyond a certain loan threshold and to a certain extent contingent on how poor the household is to start with. This argument is illustrated by complementing the existing literature with some empirical analysis of household survey data collected in Bangladesh in 1995.

Consumption data from 1072 households is used to show that the largest effect on poverty arises when a moderate-poor BRAC loanee borrows more than 10000 taka ($200) in cumulative loans. A number of pathways by which micro-credit can reduce vulnerability, namely by strengthening crisis-coping mechanisms (the 1998 flood in Bangladesh is used as a case study), building assets and 'empowering' women are discussed. Data from 1568 women are used to construct sixteen 'female empowerment' indicators and the empirical analysis that follows suggests that micro-credit has the greatest effect on female control over assets and also on her knowledge of social issues controlling for a host of other characteristics.

1.0 Introduction

The existing evidence on the impact of micro-credit on poverty in Bangladesh is not clear-cut. There is work that suggests that access to credit has the potential to significantly reduce poverty (Khandker 1998); on the other hand there is also research which argues that micro-credit has minimal impact on poverty reduction (Morduch 1998).

The evidence on reducing vulnerability is somewhat clearer. The provision of micro-credit has been found to strengthen crisis-coping mechanisms, diversify income-earning sources, build assets and improve the status of women (Hashemi et al 1996, Montgomery et al 1996, Morduch 1998, Husain et al 1998).

This paper explores the relationship between micro-credit and the reduction of poverty and vulnerability by focussing on BRAC, one of the largest micro-credit providers in Bangladesh. The main argument in this paper is that micro-credit contributes to mitigating a number of factors that contribute to vulnerability whereas the impact on income-poverty is a function of borrowing beyond a certain loan threshold and to a certain extent contingent on how poor the household is to start with. This argument is illustrated by complementing the existing literature with some empirical analysis of household survey data collected in one region of Bangladesh in 1995. The paper is organized as follows. Section 2.0. provides a detailed literature review concentrating on the issues that will be explored in the subsequent sections. Section 3.0. moves onto an analysis of the poverty-impact of BRAC's micro-credit program in one region of Bangladesh. Section 4.0.-

6.0. assesses micro-credit's role in reducing vulnerability by strengthening crisis-coping mechanisms, building assets and 'empowering' women. Section 7.0. concludes by summarizing the main findings and drawing a few policy implications.

2.0. Micro-credit, poverty and vulnerability in Bangladesh: what does the literature say?

The evidence on the impact of micro-credit can be assessed from two inter-related angles. Firstly who does credit reach and secondly how does it affect the welfare of different groups of individuals and households? This section will briefly look at 'targeting issues' before moving onto the evidence on household welfare; the focus will be on BRAC households (see appendix 1 for a detailed description of the organization) although the evidence from other micro-credit programs will also be discussed in passing.

BRAC's official 'targeting' criteria are households who have less than 0.5 acres (50 decimals) of land and whose main occupation is manual labour. In practice, the land criterion is the one that is more closely adhered to in the field. Several studies show that between 15-30% of BRAC members are from 'non-target' households measured in terms of land (Mustafa et al 1996, Montgomery et al 1996, Zaman 1998, Khandker 1998)[2]. However these households are typically marginal farmers and can be considered part of the 'vulnerable non-poor' group, prone to transient bouts of poverty (Zaman 1998). On the other hand there is also evidence that there are a large proportion of extremely-poor households in BRAC groups (Khandker 1998, Husain 1998, Zaman 1998). For instance in Khandker's sample 65% of BRAC households had no agricultural land compared to 55% for Grameen members and 58% for a comparable Government-run micro-credit program. Moreover non-land indicators of extreme poverty (number of income earners, illiteracy, female headedness, disabled household head) also point to the fact that BRAC targets a significant number of extremely poor households (Halder and Husain 1999).

Not only do the poorest join BRAC's credit program, but their borrowing pattern is similar to better-off members of their group (Zaman 1998, Halder and Husain 1999). In other words the presence of wealthier households does not appear to affect the credit supply to poor households; however there is evidence to suggest that poorer households use a larger share of their loans for consumption purposes compared to better-off households (Halder and Husain op.cit). Having noted that the poorest join BRAC's credit program and that they also actively borrow after they join, it has to be mentioned that there is evidence which suggests that households who join micro-credit programs a few years after the village group has been established tend to be less poor

[2] It is interesting to compare this figure with Copestake's (1992) evaluation of India's Integrated Rural Development Project (IRDP) where the proportion of non poor households ranged upto 36%.

compared to the members who join at the start of the program. This is reflected in the landholding figures in table 2.0. for BRAC members and a similar pattern has been observed for Grameen Bank members (Matin 1998). This feature of better-off households joining over time has also been noted as a general rule of thumb in many targeted anti-poverty programs worldwide (Lipton 1996).

The poverty-reduction impact of micro-credit in Bangladesh remains controversial. Data collected by the World Bank in 1992 have been used to show widely varying results depending on the methodology chosen to assess impact. Khandker (1998) estimates that for every 100 taka lent to a woman, household consumption increases by 18 taka; interestingly the figure is 11 taka if the same amount was lent to a man. Moderate poverty falls by around 15% and ultra-poverty by 25% for households who have been BRAC members for upto three years controlling for other factors according to the author. Interestingly, this rate of poverty reduction appears to decline with increasing membership length. For instance, for households who have been members for more than five years the absolute rate of reduction was 9% for moderate poverty and 18% for ultra-poverty suggesting that the rate of poverty reduction per year was considerably lower than for households who had been members for upto three years. Moreover, given the fact that the 'less than three years' category has a lower average cumulative loan size (3348 taka) compared to the 'five years-plus' category (6567 taka), Khandker's results also suggest that the poverty reduction impact of credit declines with cumulative loan size for BRAC. Khandker's results are more intuitive in the case of the two other micro-credit programs in his study, Grameen and BRDB[3], where the rate of reduction in the incidence of poverty increases with cumulative loan size.

Morduch (1998) points out a problem with this analysis. He notes that the assumption of perfect targeting which underlies Khandker's selectivity correction is flawed given the fact that in the data set 30% of households were above the eligibility threshold. Using an alternative approach to correct for selectivity, Morduch finds no evidence of increases in consumption (and therefore reduction in poverty) using the same data. However, he does find that micro-credit contributes to reducing household vulnerability, since consumption *variability* is 47% lower for eligible[4] Grameen households, 54% lower for eligible BRAC households and 51% lower for eligible BRDB households compared to a control group.[5] This consumption smoothing is driven by income smoothing as evidenced by the significantly lower labour supply variability experienced

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[3] BRDB stands for the Bangladesh Rural Development Board

[4] Morduch only includes households who fulfill the targeting criteria of the three organizations and labels them 'eligible households'

by micro-credit members compared to the control group[6]. The importance of this result cannot be over-emphasized given the fact that seasonal deficits play a key part in the poverty process in Bangladesh (Rahman 1995). Essentially Morduch's results indicate that program participants do not benefit in terms of greater consumption levels, but they participate because they benefit from risk reduction.

There is other work in Bangladesh supporting the hypothesis that micro-credit impact is more significant for vulnerability than for income-poverty. Montgomery et al (1996) use retrospective questioning to calculate changes in household income 'since the last loan' for a sample of ninety six BRAC borrowers. They find that improvements in household income are greater for third time borrowers compared to first time borrowers but these gains are small (6% for third time borrowers and 1% for first time borrowers). However, the growth in 'productive enterprise' assets, show a 95% growth for third time borrowers during the course of the last loan period and 24% for first time borrowers. Whilst these results are intriguing the limited sample size makes robust comparisons difficult and hence the conclusions need to be interpreted with considerable caution. Mustafa et al (1995) compare households who joined four years prior to their 1993 survey with households who joined one year before the survey. The 'older' members are found to have *'average gross household asset values which are 112% higher'* (pp. 32) and *'average weekly household expenditure which was 26% greater than the 'newer' members'* (pp. 32). Evidence on the beneficial impact of micro-credit on vulnerability can also be found in case study material. Khan et al (1998) track thirty five BRAC borrowers over a period of two years with repeated interviews. The pattern that emerges is that of households using credit for multiple [7] purposes, smoothing consumption as well as investing in existing or new enterprises.

There appears to be a growing consensus that moderate-poor micro-credit borrowers benefit more than extremely poor borrowers in terms of a reduction in income (consumption) poverty. The basic premise is that the poorest have a number of constraints (fewer income sources, worse health and education etc) which prevent them from investing the loan in a high-return activity. This could be due to the higher risk associated with a high-return activity or because of a long gestation period for the returns to accrue (Wood and Sharif 1997). This is borne out by detailed case-study evidence (Farashuddin et al 1998) and by comparing participants of credit programs

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[5] These results are statistically significant at the 95% level.

[6] Morduch's estimates of labour supply variability is 39-46% lower for micro-credit members compared to a control group.

[7] The authors estimate that around 67% of the loan is used for investment purposes, another 12% to repay existing loans, 7% for household consumption and the remainder used for other activities.

who cater to different socio-economic groups (Montgomery et al 1996)[8]. The empirical analysis in this paper will attempt to shed some more light on this issue.

The pathways by which micro-credit reduces vulnerability, that have been discussed here, relate to income and consumption smoothing and asset building. However, the impact of credit on female empowerment, or a reduction in 'female vulnerability' has also received considerable attention.

Female empowerment in Bangladesh can be viewed against the backdrop of 'patriarchy', defined by Cain et al (1979) as a '*set of social relations with a material base that enables men to dominate women'* and hence can be thought of in terms of an improvement in intra-household gender relations (Naved 1994, Kabeer 1995, Hashemi et al 1996). Moreover given the institution of *'purdah'* (loosely translated as 'veil'), a pervasive social construct which restricts the female sphere within a typical Bangladeshi household, 'female empowerment' can also be viewed in terms of a woman's interactions outside the homestead and the acquisition of skills, knowledge and confidence that such interactions can bring (Amin et al op.cit., White 1992, Mahmud 1994).

The impact of credit on female empowerment (reduction in vulnerability) is controversial in the literature. One camp believes that credit programs positively contributes to female empowerment and a variety of empirical results are used to argue this case. A second, more skeptical, viewpoint believes that credit programs do little to alter gender relations in favour of females but in fact may contribute to reinforcing existing gender imbalances.

Given the wide range of possible indicators of empowerment it is useful to start by reviewing the criteria that other researchers have used and their broad findings. Amin et al's (1994) work in thirty six villages in Bangladesh showed that membership in BRAC positively affected a woman's decision making role, her control over resources and mobility but less so on their attitudes regarding marriage and education of their daughters. The authors also note that their respondents felt that membership in credit programs is important from the standpoint of reducing their chances of desertion by their husbands. It is the fact that women are viewed as the source of an important resource that appears to underly these improvements in their status. This is

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[8] Montgomery et al compare the performance of BRAC borrowers with the borrowers from a Government-run micro-credit scheme, the Thana Resource Development and Employment Programme (TRDEP). TRDEP's borrowers' initial endowment conditions is shown to be higher than BRAC's (average pre-loan landholding is 46 and 30 decimals for TRDEP and BRAC members respectively and the percentage of income derived from daily labour is 5% and 32% respectively) whilst the credit-delivery mechanism and average loan size are broadly speaking very similar. The typical TRDEP borrower's increase in assets and income during the course of the most recent loan is higher than BRAC's giving rise to the author's contention that better-off borrowers benefit more than poorer borrowers.

reinforced by Naved (1994)[9] who finds that the women credit-program participants in her sample felt their status had improved within the household due to the fact that they were seen as income earners for the family through their access to credit. The women conceptualized this improvement in status by stating that they were more active participants in household decision making and had more control over household income, particularly the portion which was derived from their own earning. The women in this article also discussed the benefits of participating in a group in terms of addressing social problems as a joint unit citing a number of incidents where group pressure helped resolve family disputes.

Another seminal article supporting the 'favourable view' on credit and empowerment is that by Hashemi et al (1996). The authors develop an 'empowerment index' based on eight empowerment indicators namely mobility, economic security, ability to make small purchases, ability to make larger purchases, involvement in major decisions, participation in public protests and political campaigning, relative freedom from family domination and political and legal awareness. Their analysis establishes that a woman contributing to her household's income is a significant contributing factor towards her empowerment, a claim also made by White (1992) based on her fieldwork in rural Bangladesh. However Hashemi et al (op.cit) also show that the '....*probability of empowerment is eight to twelve times as high for a woman who is contributing to family support or involved in a credit program (and not contributing)* (pp. 645 parenthesis in original text). In other words the authors argue that credit programs can empower women independently of whether they contribute to family income or not, having controlled for other factors.

The focus of those skeptical about the empowering effect of micro-credit has been on the issue of women's control over loans. Goetz et al (1996) used a sample of 253 female borrowers covering four rural credit providers in Bangladesh and classified the extent of control by the loanee into five categories: full, significant, partial, very limited and no involvement. Their qualitative investigation of loan histories led the authors to conclude that *'About 63% of the cases fall into the three categories of partial, very limited or no control indicating a fairly significant pattern of loss of direct control over credit'* (pp. 49). The authors disaggregated their data in terms of loan activity and concluded that investing in traditional women's work increased their chances of being able to control the loan. Moreover the paper suggests that an inverse relationship between loan amount and control exists as well as diminishing control beyond a threshold level of membership

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[9] Naved (1994) uses Participatory Rural Appraisal (PRA) techniques to identify the effect of participation in Save The Children's savings and credit program in Manikanj.

age. This is explained by the gendered divisions of cash control within the household; women may be permitted to handle small amounts but men take control beyond a certain amount. However the article is flawed in several respects. For a start the interpretation that 63% of women having 'partial, very limited or no control' whilst factually true is also misleading in the sense that one could sum up the figures and also conclude that 61.3% of the women have 'full, significant or partial' control over their loans and therefore a fair degree of control over their credit. Moreover, the disaggregation of the sample into extremely small sample sizes[10] makes comparisons of loan control across the four organizations studied unreliable. Furthermore, in the case of BRAC, the authors suggested complementing credit with social development inputs given the fact that only 28% of the cases fell in the 'full' or 'significant' loan control categories. However, BRAC's social development inputs are more extensive than Grameen Bank's and yet the female loan control figures in their paper are higher for the more minimalist Grameen program, which contradicts the authors' hypothesis. Whilst the paper recognizes that the low BRAC figure could be a consequence of the organization's focus on promoting non traditional enterprises for women, it fails to mention that for many such new activities BRAC takes responsibility for much of the decision making regarding the enterprise accounting for the borrower's lower 'loan control' scores[11]. Montgomery et al (1996) also have reservations about the 'empowering effect' of BRAC's approach to micro-credit. Their argument is based largely on secondary sources and a small field survey of sixty seven BRAC borrowers again focusing on the issue of control over loans. Whilst the authors admit that their sample is small, they on balance support Goetz et al's (op.cit) and Whites' (1991) view that micro-credit reinforces existing gender

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[10] For instance the total sample size for one organization is thirty nine women out of which percentage figures were derived for the five categories of control.

[11] Activities can be non traditional in the sense that they could be new to rural women or new in general in rural Bangladesh. BRAC provides loans to both types of activities as mentioned by Goetz et al (op.cit) but provides a comprehensive 'support structure' mainly for the latter type as part of its 'integrated credit' programs e.g. sericulture and social forestry. For instance in the sericulture sector BRAC supplies the eggs to the silkworm rearer, plants the mulbery trees, trains the entrepreneur in silk rearing, arranges for extension services by a BRAC rearing specialist, purchases the cocoons from the rearer from her homestead and supplies these to a BRAC silk reeling centre. As such the woman loses 'control' over her loan in that she does not make decisions regarding input supply or marketing but she is not losing this to another member of the household but to the organization. Moreover this 'loss' is likely to be temporary in that BRAC intends to withdraw its support mechanism over time once these currently 'non traditional' activities become more commonplace in rural society and complementary services are made available by either the private sector or the Government in terms of factor and output markets as well as extension services. However for activities common in rural areas but non traditional for women BRAC does not have this type of support yet e.g. rural restaurants and grocery shop loans as these activities are part of BRAC's 'minimalist credit' intervention. It is assumed that given the nature of these activities both sexes within the household will pool their labour to manage the activity; it is common to see the female supplying the food to the rural restaurants and an adult male, commonly her husband, serving the customers.

patterns and inequalities by promoting traditional income generation activities, which they believe do little to alter the social status quo.

In view of the fact that the decision-making over the actual loan is likely to be shared by the borrower, her family members and BRAC depending on the end-use of the loan, it can be argued that it is more appropriate to focus on changes in the overall status of a woman derived from the fact that she is the source of an important household resource (Sen 1990). Hashemi et al (op.cit) pick up on this point and using ethnographic data from sixty credit program participants they conclude that whilst women who control their loans have the most chance of being empowered, even women who surrender all of their loans to their husbands are likely to be more empowered than non-members.

On the whole, the evidence presented by those who argue that micro-credit improves female status within the household appears more convincing that that argued by the 'skeptics' camp. There are two main reasons for this contention. First the underlying thread of the 'positive' argument, that access to an important household resource (credit) enhances a female's status within the household is both intuitively appealing and resonates with the theoretical literature on bargaining models of the household (Lundberg and Pollack 1993), Secondly, the focus on female control over loans as a key component of the 'skeptics' argument fails to recognize that credit enters the overall household income pool and that household members jointly participate in the loan investment. One of the empirical sections in this paper aims to build on the literature by estimating the impact of BRAC's credit program on a range of variables that attempt to measure female empowerment.

We now move onto the next part of this paper which will use recent data to assess the poverty-impact issue in greater depth.

3.0. BRAC's impact on poverty: an empirical analysis

A household questionnaire was administered to 547 BRAC members and a control group of 525 eligible non-members in ten villages where BRAC operates in Matlab district, Bangladesh. This data was collected by the BRAC-ICDDR,B Joint Research Project in Matlab district, Bangladesh between April and August 1995. Details of the research project, the survey and the variables that were collected can be found in Zaman (1998). The survey contained a detailed consumption expenditure section from which the poverty measure for this analysis, total consumption per adult equivalent, was constructed.

As with any program evaluation, issues of selectivity bias and the counterfactual need to be addressed. In the case of micro-credit the additional issue of the fungibility of money also needs

to be taken into account. Appendix 2 discusses these issues and the way this paper approaches these concerns.

In view of the need to estimate the selection process into BRAC's program we start by defining a reduced form BRAC participation equation:

$$Y_i^* = s + d\,X_i + u_i \qquad\qquad \text{(equation 1.0)}$$

Y_i^* is a latent (unobserved) continuous variable representing the propensity of a household to join BRAC

X_i is the vector of individual, household and village characteristics that affect the probability of participation in BRAC

The problem is that there may be a systematic, unobserved process that governs both the 'participation' equation and the 'consumption equation'. This would lead to the error terms in the two equations being correlated and conventional estimation methods such as OLS would produce biased and inconsistent results (Reilly 1990).

Hence the potential endogeneity of the 'BRAC variable' needs to be tested and controlled for. We use the Heckman two-step technique which first estimates equation 1.0. and derives maximum likelihood estimates from the coefficients of the 'participation equation'. Using these estimates a variable known as the Mills ratio is constructed as follows:

$$l_i = f(r + d\,X_i) \div j(r + d\,X_i)$$

Where f is the density function of a standard normal variable and

     j is the cumulative distribution function of a standard normal distribution

     l_i is the Mills ratio term

The second stage involves adding the Mills ratio to the consumption equation and estimating the equation using OLS, as follows:

$$c_i = b_0 + b_1 W_i + b_2 Y_i + b_3 l_i + x_i$$

where $E(x_i) = 0$

c_i is the log of total consumption per adult equivalent

W_i is a vector of individual, household and village characteristics

A crucial problem in empirical work is finding an appropriate identification variable for this two step procedure. This variable needs to influence participation but not poverty. Moreover, even if an appropriate identification variable is found, the results from the procedure can be sensitive to the choice of this variable. Due to this limitation the results obtained from this procedure need to be checked for 'robustness'.

In the following empirical estimation the 'number of eligible households in each village in 1992' will be used as the 'identification' variable.[12] The rationale behind this is that while a larger number of potential members in a village will reduce the chance of any one eligible household from participating in a BRAC Village Organization[13] it is difficult to see why this variable should affect an individual household's poverty status. However, this variable will have to be tested using the data to see whether it is a significant determinant of the 'participation model' and not significant in the 'consumption equation'.

Detailed definitions of the variables used in the empirical estimation are given in table 3.0. The variables used in the 'poverty model' are those that can be theoretically justified using the basic agricultural household model and also those that one can argue are exogenous when modelling poverty. Membership in other NGO's is included to capture the effect of alternatives to BRAC credit. The amount borrowed from BRAC is interacted with landholding size in order to assess whether the effect of credit is any different for households who are ultra-poor (proxied as those with less than ten decimals of land) compared with moderate-poor households (proxied as BRAC members with greater than ten decimals of land). Partitioning the poor in this way is justified by the differences in poverty across these landholding groups (BBS 1995).

3.1 Results from the multivariate analysis

When equation 1.0. is estimated we find that the TGHH92 (number of TG households in the village in 1992) variable is a significant determinant of participation in BRAC (at the 1% level). When the same independent variables are used to model consumption per adult equivalent one

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[12] I am grateful to Professor Mark Pitt of Brown University for making this suggestion

[13] A BRAC VO's size ranges from 25-40 members. Whilst larger villages have more than one VO there is still a large portion of eligible households who do not join or are not selected. The percentage of TG households covered in the Matlab villages where RDP is present is 51%

finds that TGHH92 variable is not significant, at the 10% level[14]. As a result, this variable can be used as an identification variable in the Heckman procedure.

The first equation that is estimated is the Heckman two-step equation with the TGHH92 variable as the identifying variable. In order to test for selectivity we use a basic specification for the second stage consumption equation using only the BRAC membership dummy as the 'BRAC variable':

Equation 3.1.(using TGHH92 as the identification variable)
BRVO = f(AG1560M, AG1560F, ADEQPR, AGHHH, AGHSQ, EARNER, IEMBNK, HHHLBR, LGLAND, MARKET, OTHNGO, PRIMHHH, SECHHH, SXHHH, TGHH92)

LGCOAD = f(AG1560M, AG1560F, ADEQPR, AGHHH, AGHSQ, EARNER, IEMBNK, HHHLBR, LGLAND, MARKET, OTHNGO, PRIMHHH, SECHHH, SXHHH, BRVO, LAMBDA)

The coefficients and significance levels of the BRVO and LAMBDA terms are reported in table . The result suggests that there is no selectivity bias. However in order to test for the robustness of this result the 'identification on functional form' method is used in equation 3.2. This means that TGHH92 is included in both equations along with the other common independent variables. Identification is achieved by exploiting the fact that the Mills ratio term (lambda) is a non-linear combination of the independent variables in the 'participation equation'.

Equation 3.2. (identifying on functional form)

BRVO = f(AG1560M, AG1560F, ADEQPR, AGEHHH, AGSQ, EARNER, IEMBAN, HHHLBR, LGLAND, MARKET, OTHNGO, PRIMHHH, SECHHH, SXHHH, TGHH92)

LGCOAD = f(AG1560M, AG1560F, ADEQPR, AGEHHH, AGSQ, EARNER, IEMBAN, HHHLBR, LGLAND, MARKET, OTHNGO, PRIMHHH, SECHHH, SXHHH, TGHH92, BRVO, LAMBDA)

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[14] The coefficient for the TGHH92 in the participation equation is –0.001 (significant at the 1% level) and for consumption it is –0.0004 (not significant at the 10% level).

The coefficient and significance levels of the BRVO and LAMBDA terms are reported in table 4.0. Now the coefficient on the LAMBDA term suggests that there is selectivity bias (significant at the 10% level).

The significance of the lambda coefficient and the sign of the 'BRAC' term are strikingly different in the two models which raises doubts as to the robustness of TGHH92 as an identification variable. Hence, it is difficult to make a conclusive comment on whether there is selectivity bias or not.

However even though 'identifying on functional form' is not an ideal way of correcting for selectivity bias it does have its merits. For a start the finding that the problem of selectivity bias exists in this model is intuitively appealing. The positive coefficient on the lambda term suggests that the unobservable factors which influence participation in BRAC are positively correlated with the unobservable factors which influence household consumption. For instance more confident, enterprising women are more likely to join BRAC and are also more likely to positively affect household welfare.

Secondly, identifying on functional form as opposed to using the TGHH92 variable allows us to incorporate village-level effects by including a dummy variable for each village. Equation 3.1. cannot accommodate village dummies as the TGHH92 variable is itself a village-level variable. It can only include other similar village variables (IEMBNK, MRKTIM) which partially control for village effects.

The question also arises as to whether one should simply use OLS in view of the lack of an 'ideal' way of correcting for selectivity. As such two further regressions will be estimated; one which identifies on functional form but with village dummies and another simple OLS model with village dummies. In both these two specifications the other BRAC variables such as loan size will be included.

Equation 3.3 (identifying on functional form with village dummies)

BRVO = f(AG1560M, AG1560F, ADEQPR, AGEHHH, AGSQ, EARNER, HHHLBR, LGLAND, OTHNGO, PRIMHHH, SECHHH, SXHHH, VIL2, VIL3, VIL4, VIL5, VIL6, VIL7, VIL8, VIL9, VIL10)

LNCOAD = f(AG1560M, AG1560F, ADEQPR, AGEHHH, AGSQ, EARNER, HHHLBR, LGLAND, OTHNGO, PRIMHHH, SECHHH, SXHHH, VIL2, VIL3, VIL4, VIL5, VIL6,

VIL7, VIL8, VIL9, VIL10, BRVO, MLOADUM1, MLOADUM2, MLOADUM3, ULOADUM1, ULOADUM2, ULOADUM3, MEMLEN1, MEMLEN2, MEMLEN3, MEMLEN4, LAMBDA)[15]

Equation 3.4. (OLS with village dummies)
LNCOAD = f(AG1560M, AG1560F, ADEQPR, AGEHHH, AGSQ, EARNER, HHHLBR, LGLAND, OTHNGO, PRIMHHH, SECHHH, SXHHH, VIL2, VIL3, VIL4, VIL5, VIL6, VIL7, VIL8, VIL9, VIL10, BRVO, MLOADUM1, MLOADUM2, MLOADUM3, ULOADUM1, ULOADUM2, ULOADUM3, MEMLEN1, MEMLEN2, MEMLEN3, MEMLEN4)

The results for the BRAC variables and the lambda term can be found in table 4.0. All the results in table 4.0 are heteroscedasticity-corrected (Whites correction) estimates[16].

Table 4.0. shows that in both equations 3.3. and 3.4. the coefficient for the BRAC members who have more than ten decimals of land and have borrowed more than 10000 taka is positive and statistically significant at the 10% level. However, the interpretation of this coefficient is not unambiguous.

Borrowing more than 10,000 taka (the mean loan size for the '10,000 plus' category is 13090 taka) raises a moderate-poor households' consumption per adult equivalent by 18.8% relative to an identical non-borrowing BRAC member in equation 3.3. Equation 3.4. suggests that borrowing more than 10,000 taka raises a households' consumption per adult equivalent by 19.3% relative to an identical non-borrowing BRAC member. However, if the 'base category' is changed from 'non-borrowing member' to 'eligible non member' then the effect of borrowing more than 10000 taka varies significantly according to the specification used. For instance in equation 3.3. the BRVO coefficient is significantly negative and a household borrowing more than 10000 taka is 48% worse off compared to an eligible non-member. On the other hand according to the OLS equation 3.4. a household with more than 10000 taka in loans is 13.8% better off than an eligible non-member.

Hence the conclusions on RDP's impact on its members' welfare depend on which econometric specification one considers to be more valid and which control group (non borrowing member or eligible non member) is considered more appropriate. In view of the fact that cumulative borrowing is largely a function of membership length (Mustafa et al 1995, Montgomery et al

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[15] The BRAC loan and membership duration dummies could not be included in the first stage equation due to endogeneity.

[16] The econometric package LIMDEP was used for the empirical work in this chapter.

1996) and socio-economic differences between borrowers and non-borrowing members are minimal (Zaman 1998) it can be argued that the non-borrowing member control group is a better comparison group.

It would be tempting to conclude unequivocally that the ultra-poor benefit less than the moderate poor. However, given that the coefficients for the loan sizes which are smaller than 10000 taka are not significant at the 10% level for both households with more than ten decimals of land and those with less than ten decimals compared to non-borrowers it is difficult to be so sure. One can only point to the MLOADUM3 result and conclude that whilst there is some evidence that credit has the potential to benefit the moderate poor, the Matlab data cannot argue the same for the ultra-poor. However, the coefficient on ULOADUM3 is only marginally not significant (p = 0.12) which could suggest that the ultra-poor may benefit significantly at a higher loan threshold. The fact that the coefficient on the 'ten thousand' taka category is markedly different compared to the other loan categories may seem puzzling. However, households who had borrowed more than ten thousand taka had spent significantly more (at the 5% level) in terms of non-land 'productive assets' (poultry, livestock in particular) during the one year prior to the survey compared to members who had borrowed less than ten thousand taka[17]. Montgomery et al's (1996) results on the sharp growth in productive assets for third time borrowers, compared to first time borrowers, is closely related to the evidence presented here.

The intuition behind significant improvements in welfare taking place once a household has crossed a certain loan threshold can also be possibly interpreted as a switch from traditional, low-return on-farm activities to higher-return off-farm activities over time (Ravallion and Wodon 1996). As households become more accustomed to borrowing from BRAC they are likely to be more willing to take such risks. Table 2.0. appears to show that an occupational shift takes place as membership length (which is highly associated with cumulative loans) increases. This loan threshold effect could also be due to the fact that initial loans are often used for consumption purposes, repaying debts and repairing homesteads while subsequent ones are used for investment purposes.

Whilst most observable 'initial endowment' conditions have been controlled for in the regression, the selectivity correction in the analysis does not cater for the fact that there may be certain unobservable characteristics that influence a certain household's decision to borrow more than 10000 taka which also positively affect household welfare. However, given that the loan size is a

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[17] The expenditure per head during the year prior to the survey on 'productive assets' was taka 368, 542, 438, 768 for the 'no loan', 'less than 5000 taka', '5000-10000 taka' and 'greater than 10000 taka' categories.

cumulative total (i.e. not an average) of 10000 taka, which is largely a function of membership length, this problem is unlikely to seriously affect the results.

One result which does appear 'initial endowment induced' is the significantly positive coefficient on the MEMLEN1 variable. Common sense and empirical evidence (Mustafa et al 1996) suggests that the duration of membership is more likely to positively influence welfare levels after a few years have elapsed for the reasons discussed earlier. As such the relatively more significant impact of the 1-10 month membership length variable, relative to the other membership length categories, points to the fact that this group of borrowers started 'better-off' than 'older' members as suggested in section 2.0.

In order to assess the other non-BRAC determinants of poverty the full regression results for equation 3.3 are included in table 5.0. Aside from the 'BRAC variables', poverty is significantly determined by the age, education and occupation of the household head, the dependency ratio, the wealth endowment of the household (as proxied by land value) and village conditions.

The next three sections of this paper address different aspects of household and individual vulnerability. One of the key sources of vulnerability in Bangladesh is natural disasters and the next section examines the response of, and recourse to, BRAC during Bangladesh's recent floods.

4.0. Reducing vulnerability during a crisis: micro-credit's role in the 1998 Bangladesh floods

Whilst under certain restrictive conditions the poor may not necessarily also be vulnerable to fluctuations in their income (Glewwe and Hall 1998)[18] it can be plausibly argued that almost all poor households in Bangladesh are vulnerable due to the extent and frequency of natural disasters in the country.

The June-October 1998 floods in Bangladesh have been described as the 'worst in living memory' (World Bank 1998). Whilst the country is accustomed to yearly periods of moderate flooding the recent floods inundated two thirds of the country[19] and severely disrupted the daily lives of the majority of the population. Over 1100 people died, close to half a million homes were damaged and two of the rice crops (aus and aman) were significantly affected.

The joint response of the Government, NGO's and the international donor community was crucial in limiting the damage caused by the floods. The immediate relief effort to prevent starvation and disease was swift and by all accounts effective. The Government focussed its relief efforts in

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[18] Glewwe and Hall (1998) argue that poor, subsistence farmers in remote areas are not necessarily vulnerable (in terms of experiencing sharp fluctuations in income) as they could be insulated from domestic and international shocks.

[19] Prior to the 1998 flood the worst recorded flood covered 52% of the country

providing food rations[20] and organizing shelters for the homeless. Grants and loans for agricultural rehabilitation were also provided.

The NGO sector also produced a coordinated relief and rehabilitation effort.[21] BRAC's immediate response was to provide food and safe water through-out the country[22]. BRAC also focussed on post-flood disease control needs; it distributed nearly a million packets of oral rehydration saline (ORS) to prevent diarrhoea and its health staff worked with government health workers in their disease prevention activities. BRAC operated a multi-pronged rehabilitation program following the relief effort. A key part of it was to supply seeds to farmers as seed storage facilities had been badly damaged during the floods. BRAC's 'integrated program' (see appendix 1) clients were given appropriate inputs in kind to assist them in continuing their activities[23]. BRAC schools[24] were repaired, new sanitary latrines were provided to affected member households and an infrastructure repair public works program was initiated to create employment. BRAC's micro-credit program also responded to the floods in the following ways:

- In line with the other major micro-credit programs in the country, it did not declare a country-wide repayment suspension but it did instruct its branch managers to apply their judgement and discretion with borrowers who could not repay. Branch managers decided to suspend payments in many areas where severe flooding had occurred. Table 6.0. shows the effects of the floods on BRAC's recovery rates.

- BRAC clients could borrow 50% of their current loan amount as a new loan and the repayment schedule was extended by six months. The idea of issuing 50% of current loans as fresh loans was based on the assumption that whatever cash in hand households had at the time of the floods was used up for immediate consumption needs. The extra liquidity was intended for daily expenses during the crisis, as well as for productive investment.

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[20] In September 1998 during the peak of the floods the government distributed Vulnerable Group Feeding (VGF) cards which ensured eight kilograms of foodgrain to four million poor households[20] for four months. The government also initiated new public works programs ('Test Relief Program) and extended existing ones (Food-for-Work program).

[21] A key part of the coordinating effort was done by the 'Citizen's Initiative for Confronting the Disaster' which was composed of senior civil society representatives including the heads of Grameen, BRAC and Proshika.

[22] Makeshift kitchens were opened in BRAC's field offices and bread, molasses and safe drinking water were distributed to around half a million households.

[23] For instance to address the damage to trees, BRAC supplied a variety of saplings to its member's involved in forestry and sericulture activities. BRAC also assisted villagers who borrowed for poultry-rearing purposes and those that had taken fisheries loans. This was done by repairing poultry shelters and ponds as well as procuring new birds and fish fingerlings.

[24] BRAC operates around 34000 Non Formal Primary Education schools

- BRAC allowed members who have a good repayment record to pay off the balance of their outstanding loan in advance so that they could apply for a new loan.
- BRAC allowed members to withdraw upto 50% of their savings

Field interviews with twenty BRAC borrowers in two regions, Matlab and Manikanj, were conducted in January 1999. The main objective was to assess the client's perception of the role BRAC's credit program played in mitigating the effects of the crisis as well as to take stock of other crisis-coping mechanisms. Participants were also asked to describe their loan history and comment on their general impressions about the impact of BRAC's credit program on their household welfare over the years. Table 7.0. provides details of the borrowing patterns of the individuals surveyed.

There are three main messages related to credit and coping in crisis that emerge out of the discussions with BRAC's clients, conversations with BRAC credit staff and figures obtained at BRAC head office:

- The majority of clients place a high priority on repaying BRAC loans, even during a crisis period, as they see it as the only way to obtain larger loans and increase their liquidity. During the flood period households preferred to cut back on their daily consumption or borrow (interest-free) from relatives rather than miss installment payments. In fact the main source of cash for loan repayments during the floods were interest-free loans from relatives (Ahmed 1998). Repayment rates fell (see table 6.0) during the floods but recovered in the immediate aftermath and by December 1998 recovery rates were close to pre-flood levels.

- Having access to their savings was welcome during the crisis but recourse to it was less than one would have expected. One of the reasons for this is that clients know that larger savings deposits within BRAC means access to larger loans[25]. Hence they perceive withdrawing money from their savings accounts as a de-facto interest-free loan as they may need to 're-deposit' some or all of the amount they withdrew in order to be eligible for the loan size that they require. However the main reason for the low withdrawal rate was probably the inaccessibility of the BRAC branch during the height of the floods in many regions – many depositors could not literally access their savings. In September 1998, during the peak of the floods, average savings withdrawal for all BRAC branches was 61% of the July figure. However, when the floods receded in October, average savings withdrawals more than doubled within a month and continued rising until year-end. BRAC members were not the

only ones who showed a greater than expected reticence to withdraw their savings during this time of dire need. Two organizations with a significant focus on savings products, Buro Tangail and Safe Save, also experienced the same phenomenon with savings withdrawals in branches hard hit by the floods similar to marginally affected branches (Wright 1999).

- Membership in BRAC's credit program offered only partial insurance to flood-affected households. These households used a multitude of survival strategies from drawing down food stocks, to using up their cash savings, borrowing from relatives and also borrowing from money-lenders. One of the most common coping mechanisms was cutting down on food consumption and to a certain extent switching to cheaper items, though scope for the latter was limited for the poor.

5.0. Reducing vulnerability through asset-creation

An important form of self-insurance against crises is building up a household's asset base which can reduce vulnerability through a number of channels. For a start, some assets can be readily sold to meet immediate consumption needs. Secondly, asset-building can improve creditworthiness, thereby improving a household's borrowing chances during a crisis. Thirdly, a larger and more diverse asset base can reduce covariant risk.

The process by which micro-credit stimulates asset-creation, is interesting. In table 2.0. one finds that the 'oldest' members have on average the least land but also the highest value of non land assets; one plausible explanation is that borrowing from BRAC led to investment in productive capital (e.g. rickshaw, poultry, grocery shop) thereby improving their non-land asset position. Moreover the proportion of manual labourer households is lower in the 'oldest' category suggesting that the growth of non-land assets may have induced a shift from on-farm activities to off-farm self employment. Longer membership in BRAC also induces a growth in savings as shown in table 2.0, due to the requirement that members have to save at least two taka a week. The relevance of this for the reduction in vulnerability has been discussed in the previous section and will be probed further in the concluding section.

Table 8.0. is drawn from a large national survey of 1700 BRAC households conducted in 1996 (Husain ed. 1998) Whilst mean differences cannot be used to directly attribute causality, these figures lend some weight to casual field observations that suggest members use their initial loans to improve their housing condition and subsequently build up other productive assets.

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[25] BRAC, and most other micro-credit programs in Bangladesh require a minimum savings balance prior to disbursing a loan. In BRAC's case it is 5% of the disbursed amount for the first loan, 10% for the second, 15% for the third and 20% for the fourth and beyond.

However, whilst investing in enterprises can help build assets it also has its associated risks. Returns from the investment can be negative and clients can then face the prospect of asset-depletion, or reduction in consumption, in order to repay loans. Table 9.0. compares the profit rates from seven different BRAC-financed enterprises in Matlab region. The data was collected from seventy households (ten for each enterprise) in 1994 and the enterprises were selected by choosing the seven most common BRAC-financed investments (Zaman et al 1994).

There is a wide range of average profits amongst the various activities. Poultry, potato cultivation and net making head the list in terms of both economic and accounting profits[26] (over 1000 taka a month). Grocery shops are in the 'intermediate profit' category with loanees earning nearly 600 taka a month once the opportunity cost of their time has been incorporated although in terms of pure accounting profit this activity tops the list. In our limited sample we found that paddy cultivation and goat rearing yield profits of less than 100 taka a month while bull fattening was found to be a loss making endeavor.

The message from this section partially reinforces the views of those who argue that providing credit will lead to a process of asset creation and a corresponding reduction in vulnerability. However this section also cautions against assuming that this asset-creation will automatically reduce poverty or vulnerability as returns to these assets are shown to be highly variable.

6.0. Reducing the vulnerability of women: the role of BRAC's credit program

Section 2.0. provided an overview of the debate regarding the role of credit programs in affecting the status of women in a patriarchal society. This section uses survey data collected from 1568 ever-married women in Matlab region, Bangladesh between April-August 1995. Sixteen indicators of female empowerment were created ranging from knowledge and awareness of various social issues to ownership and control of assets and mobility. The indicators are listed in table 11 and the details of how they were developed are in appendix 3.

Assessing the impact of BRAC's credit program on the various dimensions of empowerment requires another brief discussion of the 'selectivity problem'. As noted in the opening section of this paper it may be the case that more enterprising, dynamic women join credit programs and that they are more likely to be 'empowered' compared to a random sample of eligible women thereby overstating the effect of BRAC. Section 3.0. discussed the Heckman procedure where a first stage equation with a binary dependent variable (participates/does not participate) was estimated and a continuous dependent variable (real consumption per adult equivalent) was used in the second stage. However, in the 'empowerment' case we have two binary variables

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[26] Economic profits incorporate the opportunity cost of labour

(participation and an 'empowerment correlate') which makes the econometric estimation even more complex.

Khandker (1996) claims that *'If both the treatment and the outcome are measured as binary indicators, identification of the treatment effect is generally not possible even with the specification of an error distribution'* (pp. 233). Maddala (1983) does not entirely eliminate the possibility of correcting for selectivity bias in this scenario but acknowledges that *'….the expressions get very messy' (pp. 282).*

Given the difficulties with correcting for selectivity in such cases this paper opts for using simple logit regressions to estimate the factors underlying the various empowerment correlates. However, the possibility of 'selectivity bias' influencing the 'BRAC effect' will be taken into account in the discussion.

The reduced form equations will be estimated as logit regressions separately for the sixteen empowerment correlates. The basic 'empowerment correlates' model is described below in equation 6.0 with variable definitions in table 10.0.

EQUATION 6.0

$$y_i = b_0 + \sum_{j=1}^{6} b_j h_{ij} + \sum_{k=1}^{5} b_k w_{ik} + \sum_{l=1}^{13} b_l v_{il} + b_m b_{im} + \sum_{p=1}^{3} b_p l_{ip}$$

where

y_i is one of the 'empowerment correlates'

h_{ij} is a vector of household level variables

w_{ik} is a vector of female specific variables

v_{il} is a vector of thirteen village dummies

b_{im} is a dummy variable for BRAC membership

l_{ip} is a vector of dummy variables based on BRAC loan size

Land per adult equivalent[27] and occupation of the household head are included in the empowerment equation as a proxy for the households socio-economic status. The number of years of female education and the household's average years of education are included as they are assumed to be positively associated with female empowerment particularly for the knowledge based variables. The literature also points to a woman's marital status, her age and whether she

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[27] The equivalence scales used are constructed as follows: adult male (1), adult female (0.83), 10-14 year olds (0.83), 5-9 year olds (0.7), 1-4 years (0.5), babies (0.2) (source Lipton 1983).

contributes to household income as important factors affecting her empowerment and as such they are included in the model (Mahmud 1994, Goetz et al 1996, Hashemi et al 1996). Moreover household size (as proxied by the number of adult equivalents) and the proportion of adult women in the household were also included in order to assess the effect of household composition on the respondents 'empowerment correlates'. This model was constructed after a series of preliminary regressions had been run in order to identify the specification of the variables in the model as well as to retain a parsimonious number of variables in the final equation.

Equation 6.0. was estimated, for each of the sixteen 'empowerment correlates'. Given the large number of estimates involved only the regression coefficients and the predicted probability estimates of the 'BRAC variables' are reported in tables 11.0 and 12.0.

6.1. Estimating the effect of BRAC on different 'empowerment correlates': the results

The clearest message from the multivariate estimation seems to emerge from the 'asset control' indicators. The results support the view that greater access to resources in terms of micro-credit enhances female control (i.e. ability to sell these assets without asking consent) over her assets, controlling for a range of other factors. Women who have borrowed more than 10000 taka are 26% points more likely to be able to sell poultry independently compared to an identical non-borrowing member[28] A female's control over her jewellery also appears to increase with loan size. Borrowers with more than 10000 taka in cumulative loans are twice as likely to be able to sell their jewellery independently compared to an identical non-borrowing member.[29] A woman's decision-making power over the use of her savings increases with loan size. The results indicate that holding other factors constant a woman with more than '10000 taka' in total loans from BRAC is 16% points more likely to have control over her savings than a non borrowing member (significant at the 10% level)[30]. The BRAC loan coefficients for the 'control over livestock' regression are not statistically significant at the 10% level.

One can question whether women who have more control over their assets in the first place are more likely to borrow larger cumulative amounts (i.e. the selectivity bias issue). The literature suggests that the decision to take increasing amounts of credit is largely a function of membership

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[28] significant at the 1% level.

[29] significant at the 10% level

[30] Using a non-member as the comparison group in the savings case would be misleading as access to BRAC savings is restricted by the organization. This is borne out by the results which show that women from BRAC households are far more likely to have savings, controlling for other factors, they are also less likely to have independent control over their savings compared to the relatively smaller number of female non-members who have savings.

length, the experience with previous loans and the household's repayment capacity (Mustafa et al 1995, Montgomery et al 1996). There is little evidence to suggest that it is a function of the amount of control a woman has over her assets. Hence, whilst recognising the possibility of selectivity bias putting an upward bias on the coefficients of the BRAC loan variables, it is unlikely that the results are significantly affected.

Table 12.0. indicates that the 'knowledge' variables, appear to be positively influenced by BRAC membership and BRAC credit, controlling for other factors. For instance, borrowing more than 10000 taka from BRAC, more than doubles the probability of a woman knowing the legal way of divorcing compared to a non-borrowing member[31]. A woman with more than ten thousand taka in cumulative loans is also 10% points more likely to be aware that dowry is illegal than an eligible non-member but this difference is not significant at the 10% level. The chances of knowing the local chairman's name is also greater for a BRAC borrower than for non-borrowers or non-members. This is significant (at the 5% level) for the less than 5000 taka category and for the 'greater than 10000 taka' group. However, the results in the 'knowledge' category are not totally uni-directional; for instance the probability of women who have borrowed less than 5000 taka and between 5000-10000 taka from BRAC, knowing the legal minimum age of marriage is 7% points and 6% points (both significant at the 5% level) respectively lower than an eligible non-borrower. However the 'marriage-age regression' also has the lowest McFadden's R squared value out of the four 'awareness' indicators (see table 13) which casts some doubt on this result.

Borrowing from BRAC appears to have a mixed impact on female asset ownership. The probability of owning poultry is 15% points greater for a non-borrowing member than for a member with more than 10000 taka[32] in loans controlling for other factors[33]. On the other hand women who borrow less than 5000 taka are 3% points more likely to own livestock[34] compared to a non-borrower. BRAC membership is a highly significant determinant of a woman having savings. A non-borrowing BRAC member is 41% points more likely to have savings compared to a non-member[35] and this figure rises steadily with loan size. This is due to BRAC's compulsory savings requirement. The other 'empowerment' indicators do not provide any significant insights. For instance the incidence of a woman becoming pregnant against her own wishes varies

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[31] significant at the 5% level

[32] significant at the 5% level

[33] It ought to be noted that by the end of 1995, less than 1% of the Matlab RDP Area Office's total loans disbursed went to poultry rearing activities (Husain et al 1996).

[34] significant at the 10% level

[35] significant at the 1% level

little with BRAC membership or loan size. Being a BRAC member also does not appear to significantly influence the 'mobility' variables[36].

The empirical work in this section supports the view that micro-credit reduces female vulnerability through two main channels. Firstly it appears that greater amounts of borrowing enhances a woman's control and decision making power over her assets. The loan threshold after which the level of asset-control appears to rise significantly is 10000 taka for women in our Matlab sample. This result is argued to be significant due to the emphasis placed on female control over assets in both the intra-household bargaining literature and in various studies on female empowerment.

Secondly the results suggest that there is a positive effect of BRAC's credit on two of the knowledge/awareness indicators[37] even after controlling for female education variables. Whilst an obvious limitation of the data is not knowing whether any of the 'knowledge' is actually put into practice, greater legal and political awareness is argued to be an important first step towards raising female consciousness of her rights within the household and in the community at large.

Conclusion

This paper argues that whilst there are several channels by which micro-credit services can reduce vulnerability there are fewer ways by which it can 'single-handedly' reduce poverty. This is partly due to the fact that the concept of vulnerability is a somewhat broader one than that of income-poverty and as such there are more channels by which 'impact' can be achieved. However there is more to the story than just definitional differences. Increases in income or consumption (i.e. reduction in poverty) can occur if credit is used for an income generating activity and that activity generates returns in excess of the loan installment repayments. However, in a scenario where the credit-financed investment does not generate a significant net profit then an asset is created which can reduce vulnerability but will not reduce poverty as the loan installment repayment takes place through a reduction in consumption and not from the returns to the investment. A temporary reduction in poverty can also occur if credit is used for non-investment purposes such as repaying existing debt, improving housing or social obligations. However, future consumption will have to be sacrificed to meet repayment obligations. The empirical evidence in this paper suggests that there may be a threshold cumulative loan size beyond which micro-credit can make a significant dent on poverty.

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[36] The exception is the result for the 5000-10000 taka loan category which suggests that households who have borrowed in this range are 13% points more likely to visit the local market alone compared to an identical non-borrowing member (significant at the 5% level).

[37] Aware that dowry is illegal and aware of the local chairman's name

This paper illustrated the potential reduction in vulnerability due to micro-credit through a number of pathways. One channel is the asset-creation associated with a series of loan-financed investments. A household who has taken several loans would typically have focussed its asset-building on the creation or expansion of one or more income-earning assets and would also have invested in improving housing conditions. Another channel through which credit reduces household vulnerability is through income and consumption-smoothing. This occurs through the creation of non-farm sources of income as well as by saving part of the loan disbursed for the lean season (Rutherford 1999). Micro-finance services also have an indirect impact on a specific type of vulnerability, namely the vulnerability faced by women in a patriarchal society. The evidence in this paper shows that a woman's control over her assets and her knowledge of social issues is enhanced after borrowing from BRAC's micro-credit program. A fourth pathway by which micro-finance appears to reduce vulnerability is through the emergency assistance provided by many micro-finance organizations during periods of acute natural disasters such as the recent floods in Bangladesh. The fact that these organizations turn into de-facto relief agencies is crucial in sustaining these households in the immediate aftermath of a natural disaster. Moreover the post-disaster rehabilitation assistance, in terms of both financial and other services, is also highly valued by micro-credit clients.

There are a number of policy implications that could be drawn from this paper, centering on issues of program design. The first observation is that the savings collected by organizations like BRAC could have a greater impact on reducing vulnerability than they currently do. Grameen, BRAC and ASA (the three largest MFI's) have collected compulsory regular savings from their clients with a view that the money would act as a de-facto lump sum 'pension' when a client leaves the organization. Access to these deposits was otherwise limited curtailing a potentially important source of consumption-smoothing. Having recognized these limitations there are an increasing number of MFI's in Bangladesh who have started providing more flexible savings products including the 'big three' mentioned above. BRAC in 1998 initiated a current account scheme which is independent of its existing long-term savings system. Now that it has been given a banking licence[38] it is likely to offer a more varied savings package. ASA in 1997 decided to allow its clients to freely withdraw their savings and the following year opened a savings service to everyone in the village. Grameen also recently introduced an open access current account scheme which can be used even by non-members. Depositors earn a competitive market interest rate and are allowed to withdraw money irrespective of whether they have an outstanding loan or not. It has to be said, though, that there are issues of prudential regulation and deposit insurance

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[38] The licence was granted in February 1999

which need to be thought through carefully as more savings are mobilized by the NGO sector in Bangladesh.

A second policy implication is that micro-credit may be a more effective remedy against poverty and vulnerability if it is complemented with other interventions. There are many programs in Bangladesh which already do so. BRAC operates a micro-credit cum food-relief program[39] for extremely poor women and an insurance company operates a joint credit and health insurance program for the poor. These interventions may be especially appropriate for the poorest households who face the greatest risks of income fluctuations and have the greatest need for a range of financial and non-financial services and are less inclined to invest in the higher risk higher return activities that could push them out of poverty.

The issue of complementarity also arises when considering the effect of micro-credit on the 'empowerment' of women. Whilst the provision of micro-credit can enhance a woman's status in the eyes of other household members, as she is the source of an important resource, social mobilization and legal education interventions in conjunction with credit is likely to have a more significant effect than credit alone.

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[39] BRAC's IGVGD program caters to the needs of the most destitute rural women for whom traditional credit programs are not the answer. This program works with women who are given monthly wheat relief rations, provides training in homestead poultry rearing and progressively offers concessional loans with a monthly repayment requirement. These members are gradually absorbed into the mainstream RDP program and offered larger loans. This mechanism is designed to facilitate the entry of the poorest into regular credit programs and acts as a transition from a relief to a longer term development program.

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Appendix 1

BRAC – a brief description

BRAC is a non-government organization (NGO) in Bangladesh which was started in 1972 as a small relief and rehabilitation program in the Sulla district of Sylhet. The organization experimented with different development philosophies and grew steadily supported by donor funding[40]. Two parallel programmes[41] merged in 1986 to form what is now BRAC's largest programme: the Rural Development Programme (RDP).

RDP is a multi-faceted programme covering over half of Bangladesh's 68,000 villages with poverty alleviation and empowerment of the rural poor as its main objectives (Chowdhury et al 1997). RDP's official target group/eligibility criterion[42] are households with less than 0.5 acres of land and whose main occupation involves manual labour for more than one hundred days a year. One of RDP's core functions is the delivery of micro-credit in order to promote income and employment generating opportunities for the poor. RDP is the second largest micro-credit provider in Bangladesh after the Grameen Bank with around 2.03 million loanees (BRAC 1998). Another part of RDP's work involves consciousness-raising activities manifested through its Human Rights and Legal Education Programme (HRLEP) and through monthly 'Issue Based Meetings'.

Credit delivery takes place through a network of BRAC local offices who transfer a large part of the burden of screening borrowers as well as monitoring and enforcing loan contracts to borrower 'groups' (Village Organizations) who accept 'joint-liability' for loan repayment[43]. Weekly Village Organization (VO) meetings, held separately for men and women, prove the focal point whereby savings are collected and loans repaid. Over 90% of VOs are composed of females in BRAC. RDP has two approaches to micro-enterprise development; the 'minimalist' versus the 'integrated/sector program approach'. Around 75% of BRAC's lending portfolio is composed of individual loans, similar to other 'minimalist' credit operations, where loans are disbursed without

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[40] Donor confidence in BRAC's management grew considerably following the organization's extraordinary achievement in reaching thirteen million households by 1990 in Bangladesh with its Oral Rehydration Therapy Extension Programme (Chowdhury et al 1996).

[41] Outreach and the Rural Credit and Training Project

[42] The terms 'target group' (TG) and 'eligible' will be used interchangeably throughout this document

[43] BRAC has 'small-groups' composed of around five to seven individuals within the VO in order for 'peer-monitoring' to take place. However the extent that loans get recovered through small-group peer monitoring in micro-credit programs has been questioned (Matin 1997). The atmosphere of mutual trust and reciprocity between lender and loanee, the individual incentive to access larger amounts of credit in the future and intense staff monitoring of individual loan use are also critical factors behind the remarkably high overall repayment rates of micro-credit loans (Jain 1996).

any complementary inputs (BRAC 1997). In the 'integrated' approach selective skills training, technical assistance and marketing interventions are provided in addition to credit. RDP provides an 'integrated' service in six sectors namely poultry, livestock, fisheries, social forestry, vegetable cultivation and sericulture. For instance BRAC emphasises vaccination support for its poultry, livestock and fisheries loanees. A key feature of the 'integrated approach' is training on a range of micro-enterprise management issues and specific technical skills training. Marketing support is also provided in a vertical chain with BRAC acting as the intermediary between different sets of loanees who are involved at various stages of the production cycle particularly in the poultry, fisheries and sericulture programmes (with urban retail outlets for silk and handicraft products). It has to be noted that these two approaches can coexist with each other in the same village; a member can either have taken a 'sectoral' loan or a 'minimalist' loan at any point in time.

BRAC also mobilizes savings from its clients. A minimum of five taka has to be deposited each week. The levels of savings that have to be maintained in order to borrow are 5%, 10%, 15% and 20% for the first, second, third and fourth (and beyond) loans respectively. The original idea behind accumulating savings was that it would benefit both BRAC and its clients. The benefit to BRAC was in terms of the savings acting as a collateral substitute and as a source of funds for on-lending. Savings withdrawals were restricted in the past on the basis that the main benefit to BRAC's clients would be to take their entire savings when they left BRAC, as a de-facto lump sum pension. However, in light of BRAC's experimentation with more flexible withdrawal systems BRAC management has recently decided to allow current accounts to be established at BRAC branches (with minimum 50 taka deposit and withdrawal) whilst still retaining the compulsory savings system. Table 1.0. summarizes the key statistics relevant to BRAC's micro-credit program

BRAC's two other main programs are the Non Formal Primary Education Programme (NFPE) which currently operates around 34,000 schools and the Health and Population Programme (HPP) which has an overall outreach of nearly ten million people (BRAC 1997). BRAC has a full time employee size of over twelve thousand, with only three hundred at head office. These summary statistics may give some idea of the scale of BRAC's operations and its decentralized nature. RDP, the program which includes BRAC's credit activities, is the largest of the three main programmes in terms of size, coverage and budget.

<u>**Appendix 2: Measuring impact: the problems of fungibility, the counterfactual and selectivity**</u>

Assessing the impact of an anti-poverty intervention such as micro-credit suffers from three major methodological problems which we now turn to.

The problem of the counterfactual

This problem is to do with evaluating what the welfare levels would be if the anti-poverty program did not exist. This issue is one of the most difficult methodological problems in evaluating micro-credit programs (Yaron et al 1997) and anti-poverty programs in general (Ravallion 1991). The literature generally uses control groups to tackle the problem of the counter-factual (Evans et al 1995, Khandker op.cit., Montgomery et al 1995, Mustafa et al 1996). Montgomery et al's (op.cit) study of RDP's impact revolves around comparing households who have borrowed more than three times and those who have borrowed once from BRAC with households who are recent members and have not borrowed acting as the control group. The authors recognize that using this control group has its shortcomings as the newer members are better off than older members in terms of 'initial endowment'.

Another suggestion in the literature is to have an appropriate model of State intervention in order to find a counterfactual for NGO programs (Besley 1997). However, Besley (op.cit) also recognizes that there are sections of the poor that the Government do not reach and as such this counterfactual may be unrealistic in practice. The micro-credit system in Bangladesh reflects this scenario; the formal financial system has had limited success in targeting the poor with the notable exception of BRDB's RD-12 project (Khandker 1998). A more appropriate counterfactual, however, is to question whether the household would have been able to access other forms of social support through informal networks or obtain micro-credit from other NGOs. In this paper, the problem of the counterfactual is addressed by using two different control groups (eligible non member and non-borrowing member) and using 'membership in other NGOs' as an independent variable.

The fungibility of money

BRAC lends to individuals who claim they will invest the money in specific income generating projects. There is no questioning the fact that not all the money borrowed from BRAC is used for 'investment purposes'. Money is fungible and often the cash obtained from BRAC is used for on-lending, for immediate consumption needs, to repay loans as well as to invest in an income generating activity.

The problem that this poses for any work on the impact of credit on household welfare is that the same loan amount could be disbursed to two women who use it in very different ways. One woman may use the bulk of the money to meet a household crisis and another may invest it in an asset which generates long term returns. This is a problem for which no easy answer exists. The best one can do is rely on the law of averages with large data sets and use existing evidence which shows that about 80% of credit disbursed by BRAC is invested in an income generating activity by the borrowing household (Mustafa et al 1996). BRAC field officials discuss the feasibility of the project with the loan applicant and once the loan is granted BRAC staff often informally monitor whether the bulk of the money was invested in the proposed project or not. The borrowers know that if they use a large portion of the loan for a totally unrelated purpose then they will face problems in accessing further BRAC credit.

The discussion in this chapter will *not* be based on the premise that taka 'x' was borrowed, invested entirely in project 'y' and that this led to a 'z' taka change in consumption. The line of argument will instead be that taka 'x' was borrowed, it was spent by a utility maximizing household and that controlling for other factors one can roughly attribute 'z' taka change in consumption to this loan.

The 'selectivity problem'

Evaluating the effect of an institution (e.g. a trade union or an anti-poverty program) on an outcome variable (e.g. wages or living standards) using regression analysis can lead to biased estimates if the underlying process which governs 'selection' into the institution is not incorporated in the empirical framework. The reason for this is that the effect of say the anti-poverty program may be over (under) estimated if program participants are more (less) able, due to certain unobservable characteristics, to derive these benefits compared to eligible non-participants.

One solution to this problem in econometric analysis is the use of the Heckman two-step procedure. The first stage models a 'participation equation', which attempts to capture the factors governing membership in a program. This equation is used to construct a selectivity term known as the 'Mills ratio' which is added to the second stage 'outcome' equation. If the coefficient of the 'selectivity' term is significant then the hypothesis that the participation equation is governed by an unobservable selection process is confirmed; moreover, with the inclusion of the extra term, the coefficients in the second stage 'selectivity corrected' equation are unbiased. However, if the coefficient of the selectivity term is insignificant, OLS estimates can safely be used for the model. Coulombe et al (1996) estimate poverty in Mauritania using this two-stage procedure. First they estimate the probability that a household will belong to a particular occupational group and then

they estimate separate welfare regressions for the different groups. Their rationale is that the determinants of poverty will differ between the socio-economic groups (e.g. land ownership is more important for agricultural households) and that the extent of poverty is also determined by the household's occupational group.

However a major problem in practice with the Heckman procedure is that of identification, similar to the problem faced when using the instrumental variables (IV) technique. The first equation must be influenced by at least one variable that is not a significant determinant of the second-stage outcome equation. This identification variable is not easy to find. Ravallion et al (1997b) model the gains to a farm household in Bangladesh from switching to a non-farm occupation where the first stage is the 'occupational selection' equation and the second is the welfare equation. The variables used for identification are household life-cycle variables as the authors postulate that the *'…stage of the life cycle is an important determinant of mobility across sectors within the rural economy but is of little consequence to consumption within sectors' (pp. 9).* In another paper, Ravallion et al (1997a) suggest using *'…years of schooling in one case and degree obtained in the other'* (pp. 4) in order to obtain identification for a Heckman procedure. However this is by no means a 'first best' solution to the problem given that both variables are likely to have a similar influence on both outcome variables. Reilly (1990) mentions the possibility of obtaining identification by exploiting the fact that the Mills ratio term is a non-linear function of the exogenous variables used in the first stage equation. Hence, all the variables in the first stage equation can enter the second stage, along with the Mills ratio term, in order to identify the selectivity effect. This 'identification on functional form' procedure is normally used to test for the sensitivity of the estimates from the Heckman procedure to the particular identification variable used. Since identification in this case is obtained 'technically' and not with a theoretically-based identification term, this type of 'identification on functional form' is generally viewed as a second-best way of using the Heckman procedure.

Khandker (1996) addressed the 'selectivity problem' using an econometric technique that had as its basis the assumption that households with more than 0.5 acres of land are not included in micro-credit programs. Khandker's view was that there were no suitable identifying instruments which would permit the use of techniques such as the Heckman procedure. However the 'half an acre restriction' has its limitations given that a sizeable proportion of credit programs in Bangladesh include members who do not fulfil this land criterion as chapter two and various other studies have indicated (Mustafa et al 1996, Montgomery et al 1996).

Appendix 3 The data for the female empowerment analysis

At the outset one must stress the importance of anthropological techniques in measuring subjective concepts such as 'empowerment'. There is generally a trade-off between the 'representative nature' of large sample surveys and detailed case study/participatory approaches in rural research. My analysis will primarily be using the former method due to the detailed depth of the Matlab 'female questionnaire' which elicited information on various dimensions of women's lives. The questions were divided into several sections including 'ownership and control over assets', 'general and legal knowledge', 'fertility' and 'mobility'.

In terms of ownership and control over resources a list of common household assets was presented and the woman was asked whether she owned the items herself, if so whether she could sell them of her own accord, if she could keep the proceeds from the sale and whether the latter actually ever happened. The legal and political knowledge section focussed on the woman's awareness regarding dowry, marriage age, divorce and 'union parishad' chairman's (local elected representative) name. The 'fertility' section probed into issues such as whether the woman decided to have a child (in conjunction with her husband) or whether it was due entirely to her husband's, or even mother-in-law's, will. The mobility section lists a number of sites in the locality such as the marketplace and questions whether the female has visited these places in the last four months and if so whether she went alone or not.

Female interviewers were hired for the survey and trained by the Matlab project's core researchers. The responses were precoded; a typical example is the general knowledge section where interviewers ticked off 'correct', 'incorrect' or 'don't know' boxes. Sixteen 'empowerment correlates' were developed from the responses to these questions. All of these 'empowerment correlates' are binary variables[44] with the value one for 'yes' and zero for 'no'. It was decided not to construct 'empowerment' indices of any sort due to the problem of assigning subjective weights to different responses. Whilst Hashemi et al (1996) used an index of empowerment for their work, their weights were based on the authors' in-depth knowledge of the households in their sample villages based on two years of prior anthropological research. This paper prefers to assess all sixteen indicators separately and then come to some general conclusions on the effect of BRAC on different aspects of empowerment. The final sample used is 1568 women out of which 379 were BRAC members and 1189 non members.

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[44] The responses were transformed into binary variables where necessary; for instance in the 'general knowledge' example discussed above, the 'incorrect' and 'don't know' responses were merged into one category.

Table 1.0. BRAC's credit programs' basic statistics (Dec. 98)

Membership	Borrowers	Cumulative disbursement	Total outstanding	Disbursement 1998	Total savings
2.76 million	2.03 million	$625.9 million	$108.9 million	$174.5 million	$46.6 million

Table 2.0: Socio-economic characteristics of BRAC members and membership length

	Length of membership				Differences in means and proportions (5% significance)			
Column number	(1)	(2)	(3)	(4)	Column differences			
	1-10 months (n=79)	11-20 months (n=127)	21-30 months (n=231)	31-40 months (n=110)	vs. (1)	vs. (2)	vs. (3)	vs. (4)
Land owned in decimals	54.9	48.9	31.4	27.2	4	4		1,2
Value of non land assets (tk.)	29221	26222	19886	31716	3	3	1,2,4	3
Total savings (tk.)	2137	3759	4408	6331	3,4		1	1
Earners to household size ratio	0.23	0.23	0.21	0.22				
Dependency ratio*	0.32	0.31	0.35	0.29			2,4	3
Age of household head	47.5	44.2	43.8	43.2	3,4		1	1
Female headed household %	8.9	13.4	15.1	10.0				
Average education in household in years	2.02	2.08	1.35	1.87	3	3	1,2,4	3
Education of household head in years	2.43	2.90	1.43	2.5	3	3	1,2,4	3
Manual labourer household head %	25.3	29.1	26.8	17.3		4	4	2,3

Note: The 'column differences' represent the significant (5% level) mean differences between one category and another for each variable. For instance columns (1) and (2) are significantly different in terms of moderate poverty at the 5% level.
Source: Zaman (1998)

Table 3.0.: Variables definitions for 'poverty models'

Variable	Definition
LGCOAD	Log of total consumption per adult equivalent
LGLAND	quantity of land owned (log)
AGHHH	age of the household head in years
AGHSQ	age of the household head squared
AG1560M	number of adult males in the household (aged 15-60)
AG1560F	number of adult females in the household (aged 15-60)
OTHNGO	1 if household member of other NGO, 0 if not
HHHLBR	1 if household head is a manual labourer, 0 if not
ADEQPR	ratio of the number of adult equivalents to household size
DEPEND	number aged under ten plus those over sixty, divided by total members
EARNER	ratio of earners to household size
HHHLBR	1 if household head is a manual labourer, zero if not
HLTHHH	1 if household head is in good health, zero if not
PRIMHHH	1 if household head attended primary school; zero if not
SECHHH	1 if household head attended secondary school, zero if not
SXHHH	1 if household head is male, zero if female
BRVO	1 if household is BRAC member, 0 if not
MLOADUM1	1 if household has more than ten decimals of land and has borrowed less than 5000 taka, 0 if not
MLOADUM2	1 if household has more than ten decimals of land and has borrowed between 5000-10,000 taka, 0 if not
MLOADUM3	1 if household has more than ten decimals of land and has borrowed more than 10000 taka, 0 if not
ULOADUM1	1 if household has less than ten decimals of land and has borrowed less than 5000 taka, 0 if not
ULOADUM2	1 if household has less than ten decimals of land and has borrowed between 5000-1000 taka, 0 if not
ULOADUM3	1 if household has less than ten decimals of land and has borrowed more than 10000 taka, 0 if not
MEMLEN1	1 if membership length between 1-10 months, 0 if not
MEMLEN2	1 if membership length between 11-20 months, 0 if not

MEMLEN3	1 if membership length between 21-30 months, 0 if not
MEMLEN4	1 if membership length between 31-40 months, 0 if not
IEMBNK	1 if village is inside embankment, 0 if not
MARKET	Distance from market in kms.
TGHH92	Number of eligible households in village in 1992
VIL1	Uddamdi
VIL2	Nilokhi
VIL3	Char Nilokhi
VIL4	Fatehpur
VIL5	Dhakirgaon
VIL6	Enayetnagar
VIL7	Munsobdi
VIL8	Shilmondi
VIL9	Sonatarkandi
VIL10	Shahbazkandi
LAMBDA	Mills ratio term

Table 4.0.: Estimated coefficients of the 'BRAC variables' in poverty models (n=1072)

	Identification with TGHH92 (eq. 3.1.)	Identification on functional form with TGHH92 (eq. 3.2.)	Identification on functional form with village dummies (eq. 3.3.)	OLS with village dummies (eq. 3.4.)
BRVO	0.07	-0.76	-0.83	-0.05
	(p = 0.72)	(p = 0.10)	(p = 0.05)	(p=0.37)
MLOADUM1			0.07	0.08
			(p = 0.41)	(p =0.38)
MLOADUM2			-0.01	-0.01
			(p = 0.91)	(p = 0.95)
MLOADUM3			0.17	0.18
			(p = 0.05)	(p = 0.06)
ULOADUM1			0.01	0.02
			(p = 0.91)	(p=0.88)
ULOADUM2			0.05	0.06
			(p = 0.56)	(p=0.55)
ULOADUM3			0.14	0.14
			(p = 0.12)	(p=0.13)
MEMLENG1			0.13	0.13
			(p = 0.08)	(p = 0.11)
MEMLENG2			0.09	0.09
			(p = 0.20)	(p = 0.23)
MEMLENG3			0.04	0.04
			(p = 0.59)	(p = 0.62)
MEMLENG4			0.09	0.09
			(p = 0.21)	(p = 0.26)
Lambda	-0.01	0.50	0.47	
	(p = 0.97)	(0.07)	(p = 0.06)	

Table 5.0.: Detailed regression results for equation 3.3

Variables	Mean	Standard Deviation	equation 3.3
HLTHHH	0.83	0.38	0.05
AG1560F	1.39	0.74	0.04
AG1560M	1.29	0.86	-0.01
SXHHH	0.85	0.36	-0.03
HHHLBR	0.29	0.45	-0.13***
BRVO	0.49	0.50	-0.82*
DEPEND	0.33	0.21	-0.18
EARNER	0.24	0.15	0.38
ADEQPR	0.82	0.07	-1.23***
PRIMHHH	0.23	0.42	0.02
OTHNGO	0.16	0.37	-0.08
SECHHH	0.13	0.34	0.14***
AGHHH	44.0	13.0	-0.01*
AGHSQ	2101.7	1257.1	0.00
LGLAND	2.31	1.44	0.07***
IEMBNK	0.52	0.50	-
MARKET	225.56	122.1	-
MLOADUM1	0.07	0.33	0.07
MLOADUM2	0.13	0.41	-0.01
MLOADUM3	0.05	0.32	0.17*
ULOADUM1	0.05	0.23	0.11
ULOADUM2	0.07	0.26	0.05
ULOADUM3	0.07	0.25	0.14
MEMLEN1	0.05	0.21	0.13*
MEMLEN2	0.09	0.28	0.09
MEMLEN3	0.19	0.39	0.04
MEMLEN4	0.09	0.28	0.08
VIL2	0.03	0.17	0.14
VIL3	0.05	0.22	0.06
VIL4	0.17	0.38	-0.12
VIL5	0.13	0.33	0.18***
VIL6	0.07	0.25	0.12
VIL7	0.46	0.21	0.15*
VIL8	0.08	0.27	0.18**
VIL9	0.06	0.23	0.15**
VIL10	0.22	0.42	-0.06
Lambda			0.47*
R squared			0.21

*** significant at the 1% level ** significant at the 5% level
* significant at the 10% level

Table 6.0. Monthly 'On Time Repayment' rates for BRAC's credit program

	Including Arrears + Advances	Excluding Advances	Excluding Arrears + Advances
July 1998	122%	99.6%	92%
August 1998	92%	78%	77%
September 1998	73%	62%	61%
October 1998	94%	77%	74%
November 1998		92%	79%
December 1998		95%	83%

Table 7.0. Loan amount and use by ten BRAC clients in Matlab region, Bangladesh

Case	1st loan (main use)	2nd loan	3rd loan	4th loan	5th loan	6th loan
1	1000tk (fish trading)	2000tk (farming costs)	6000tk (house repair after 1998 floods)			
2	3000tk (house repair)	6000tk (bought bed)	6000 (house repair)			
3	1000tk (boat repair)	2000tk (fish trading)	4000 tk (vegetable cultivation)	5000tk (land mortgaged in)	6000 tk (house repair after flood)	
4	3000tk (expanded existing grocery shop)	5000tk (expanded grocery shop)	8000tk (expanded grocery shop)	10000 tk (repaired shop)		
5	1000tk (fish trading)	3000tk (fish trading)	6000tk (land mortgaged in)	8000tk (house repair after flood)		
6	2500tk (medical expenses)	4000tk (farming costs)	6000 tk (repaid another bank loan)			
7	2500tk (expanded grocery shop stock)	6000tk (expanded grocery shop stock)	8000tk (expanded grocery shop stock)	10000tk (part-financed new transport boat)		
8	1500tk (gave husband, no idea of loan use)	2500tk (gave husband, no idea of loan use)	3000tk (bought tin for house roof)	4000tk (used for household consumption)	5000tk (potato cultivation)	4000tk (household consumption during floods)
9	1000 tk (expanded and renovated existing shop)	1500tk (bought tin for house)	2000tk (paddy cultivation)	3000tk (paddy cultivation)	4000tk (paddy cultivation)	10000tk (house repair)
10	1000 tk (house repair)	1500tk (tin for roof)	2500tk (vegetable cultivation)	4000tk (vegetable cultivation)	8000tk (materials for new housing unit)	4000tk (for flood repair)

Table 7 (cont.): Loan amounts and use in Manikanj region, Bangladesh

	1st	2nd	3rd	4th	5th	6th	7th
11	4000tk gave it to son – no idea of loan use	6000 tk (same as first loan)					
12	4000 tk (bought richshaw and rented it out)						
13	4000 tk (village restaurant)	8000 tk (village restaurant)					
14	3000 tk (bought cow)	4000 tk (repaired house)					
15	3000 tk (grocery shop)	7000 tk (grocery shop)	10000 (grocery shop)	7000 (housing loan)			
16	3000 tk (poultry investment)	4000 tk (expanded existing sweet shop)	6000 tk (sweet shop)	8000 tk (sweet shop)	7000 tk (housing loan)	10000 tk (sweet shop)	
17	2000 tk (carpentry tools for sons)	7000 tk (housing loan)	10000 tk (cow purchase)	10000 tk (paid off mother's moneylenders loan)	10000 tk (poultry rearing)		
18	3000 tk (fish net)	6000 tk (fish trading)	7000 tk (fish trading)	8000 tk (fish trading)			
19	2000 tk (house repair)	4000 tk (poultry business)	8000 tk (poultry business)				
20	3000 tk (expanded existing grocery shop)	5000 tk (house repair)	8000 tk (grocery shop)	10000 tk (grocery shop)			

Table 8.0. Membership length and asset accumulation for BRAC members

	1-11 months	12-47 months	48+ months
% houses with tin roofs	46.1	60.1**	63.3**
Productive non-land assets	5376	5293	7023**

Source: Husain (ed. 1998)

** significant difference from (1-11) month category at 5% level

Table 9.0: Monthly profit rates for seven 'BRAC loan activities' in Matlab (in taka)

	Monthly accounting profit	Monthly economic profit
Grocery shop	1883	589
Net making	1808	1036
Poultry	1296	1224
Potato cultivation	1106	1074
Paddy cultivation	75	68
Goat rearing	22	22
Bull fattening	-104	-128

Note: When calculating economic profit the opportunity cost of additional investment in the project is included for all activities. The opportunity cost of time is only calculated for potato and paddy cultivation, net making and grocery shop
Source: Zaman et al (1995)

Table 10.0 Variable definitions for the 'empowerment correlates' model

Variable	Definition
Household	
LANDEQ	quantity of land owned per adult equivalent in decimals
AGHHH	age of the household head in years
AVED	mean years of education in household
ADULEQ	number of adult equivalent members in household
PROPWO	proportion in household who are female aged 15-60
HHHLBR	dummy variable; 1 if household head is a manual labourer, 0 if not
Female specific	
CONWOM	dummy variable; 1 if woman contributes to household income, 0 if not
MARWOM	1 if woman is married, 0 if divorced, abandoned, widowed, separated or widowed
AGEWOM	age of female
EDUWOM	number of years of education of ever married woman
HLTHWOM	1 if woman is in 'self-assessed' good health, 0 if not
BRAC specific	
BRVO	1 if household is BRAC member, 0 if not
LOADUM1	1 if BRAC member and no loan; zero if not
LOADUM2	1 if borrowed less than 5000 taka from BRAC, zero if not
LOADUM3	1 if borrowed between 5000-10,000 taka from BRAC; zero if not
LOADUM4	1 if borrowed more than 10,000 taka; zero if not
Village specific	
V01	Uddamdi
V02	Sardarkandi
V03	Nilokhi
V04	Chor Nilokhi
V05	Fatepur
V06	Dhakirgon
V07	Enayetnagar
V08	Masuakhal
V09	Naranpur
V10	Monsubdhi
V11	Shilmondhi
V12	Shanaterkandhi
V13	Shabazkhandi
V14	Sharkarpur

Table 11.0 Coefficient estimates of BRAC variables in 'empowerment correlates models' (n = 1568 except for the categories indicated)

	BRVO	LOADUM1	LOADUM2	LOADUM3
Aware that dowry is illegal	0.033	-0.001	0.047	0.077
Aware of method of divorce	-0.006	-0.01	0.007	0.045**
Aware of minimum marriage age	0.036	-0.076**	-0.064**	0.008
Aware of local chairman's name	0.021	0.160**	0.089	0.123**
Owns land	0.112**	0.036	0.106*	0.058
Owns poultry	0.121***	-0.094	-0.133**	-0.144**
If owns poultry % that can sell poultry independently (n = 980)	-0.103*	0.048	-0.007	0.245***
Owns livestock	-0.046*	0.058*	0.036	0.046
If owns livestock % that can sell livestock independently (n = 103)	-0.178	-0.021	0.094	-0.265
Owns jewelry	0.08*	-0.014	-0.093	-0.089
If owns jewelry % that can sell jewelry independently (n = 694)	0.017	0.032	0.011	0.079*
Has savings	0.473***	0.086*	0.110**	0.118***
If has savings % can use savings independently (n = 379)	-0.345***	0.085	0.064	0.151*
Forced pregnancy	0.004	-0.035*	-0.006	-0.001
Visits local market	-0.037	0.084	0.097**	0.029
Visits Matlab market	-0.038	0.037	0.026	0.007

*** significant at the 1% level ** significant at the 5% level * significant at the 1% level

Table 12.0. Predicted probabilities of the impact of BRAC's credit on selected 'empowerment correlates' (n = 1568 except for the categories indicated)

	Eligible non-member	Eligible non loanee member	BRAC loanees		
Empowerment correlates			< 5000	5000 - 10000	> 10000
Aware that dowry is illegal	0.73	0.76	0.76	0.80	0.83
Aware of divorce law	0.03	0.03	0.03	0.02	0.08
Aware of minimum marriage age	0.06	0.10	0.03	0.04	0.11
Aware of local chairman's name	0.51	0.53	0.70	0.62	0.67
Owns land	0.04	0.04	0.05	0.06	0.04
Owns poultry	0.62	0.75	0.65	0.60	0.58
If owns poultry % that can sell poultry independently (n=980)	0.67	0.56	0.62	0.56	0.82
Owns livestock	0.07	0.04	0.07	0.06	0.07
If owns livestock % that can sell livestock independently (n = 103)	0.67	0.47	0.45	0.55	0.25
Owns jewellery	0.44	0.52	0.51	0.42	0.43
If owns jewellery % that can sell jewellery independently (n = 694)	0.06	0.08	0.10	0.09	0.16
Has savings	0.11	0.52	0.61	0.64	0.66
If has savings % that can use savings independently (n=379)	0.80	0.46	0.54	0.53	0.62
Forced pregnancy	0.02	0.03	0.02	0.02	0.02
Visits local market	0.19	0.14	0.13	0.27	0.17
Visits Matlab market	0.14	0.11	0.14	0.14	0.12

Table 13.0 Goodness of fit statistics for the 'empowerment correlates models'

	Maximum likelihood (restricted)	Maximum likelihood (unrestricted)	McFadden's R squared
Aware that dowry is illegal	-883.9	-770.3	0.13
Aware of method of divorce	-218.0	-171.3	0.21
Aware of minimum marriage age	-374.7	-340.8	0.09
Aware of local chairman's name	-1082.6	-947.9	0.12
Owns land	-261.0	-250.6	0.04
Owns poultry	-1037.3	-947.5	0.09
If owns poultry % that can sell poultry independently	-624.7	-590.0	0.05
Owns livestock	-380.0	-349.6	0.08
If owns livestock % that can sell livestock independently	-69.3	-51.5	0.26
Owns jewellery	-1076.5	-962.2	0.11
If owns jewellery % that can sell jewellery independently	-184.7	-121.3	0.34
Has savings	-867.2	-575.4	0.34
If has savings % can use savings independently	-251.7	-216.0	0.14
Forced pregnancy	-171.4	-142.3	0.17
Visits local market	-764.0	-647.0	0.15
Visits Matlab market	-626.7	-562.9	0.11